Trend Study 25C-22-98

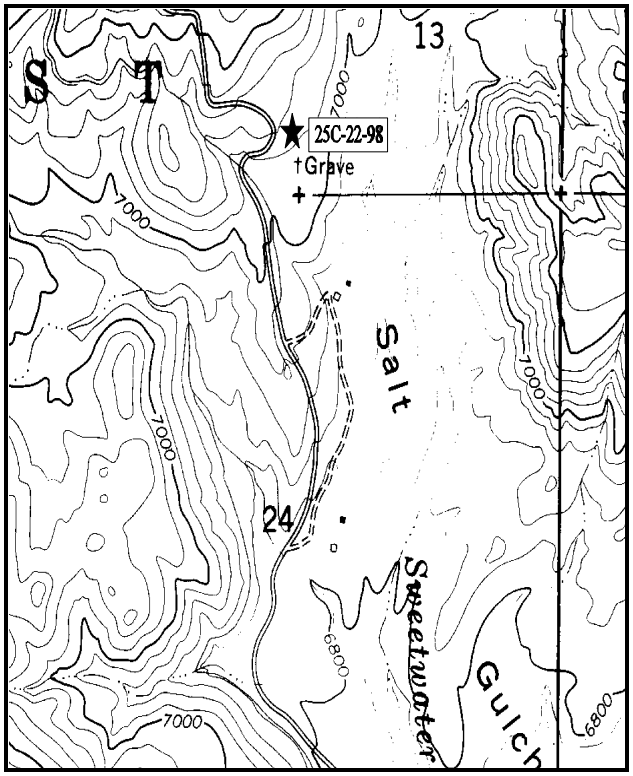
Study site name: Salt Gulch . Range type: Pinyon-Juniper .

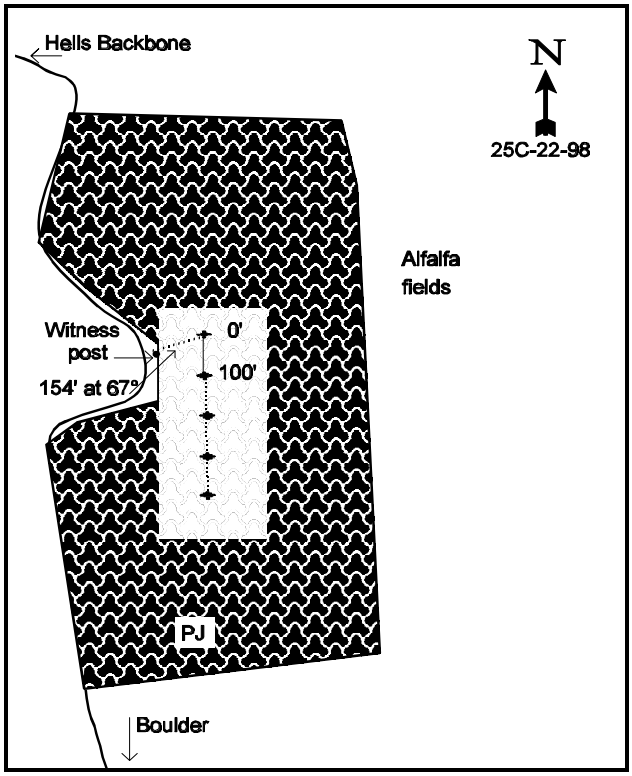
Compass bearing: frequency baseline 165 degrees.

Footmark (first frame at) 5 feet, footmarks (frequency belts) line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line4 (71ft).

LOCATION DESCRIPTION

Take SR 12 southwest out of Boulder to the Salt Gulch - Hells Backbone Road. Turn here and proceed 4.6 miles to the Salt Gulch Ranch on the left. Continue on the main road 1.3 miles to where the road makes a bend to the left. A witness post is located 15 feet off the right side of the road. The transect starts 154 feet away, bearing 67 degrees. The 0-foot baseline stake is marked by a red browse tag #7137. The 2-foot fenceposts marking the rest of the study are found at 100 foot intervals going south.





Map Name: Roger Peak Diagrammatic Sketch

Township 33S , Range 3E , Section 13 UTM 4198202.508 N, 454015.265 E

DISCUSSION

Trend Study No. 25C-22 (44-22)

The Salt Gulch study is located on a slope above the hay fields in Salt Gulch. This study samples an old pinyon-juniper type which is being considered by the Forest Service for treatment, either chaining or burning, to improve the range for deer, specifically winter-spring use. This type provides good thermal cover, but forage in the understory is very limited. Judging by the frequency of deer pellet groups, deer use is moderate at 17 deer days use/acre in 1991. Pellet group quadrat frequency data from 1994 show a relatively high quadrat frequency of deer and rabbit pellet groups. A pellet group transect read on the site in 1998 estimated 25 deer days use/acre.

The sparse vegetation, rocky nature of the soil and fairly steep, southeast facing slopes all serve to limit choices and potential for success for any treatments in this area. Topography varies, but at the study site the slope is 6-8% with an eastern aspect and an elevation of 7,050 feet. The soil is relatively shallow with an estimated effective rooting depth (see methods) of nearly 13 inches. Texture is a sandy loam with a neutral pH (7.2). Parent material is of igneous origin. Rocks are common in the profile and on the surface where they currently (‘98) provide 29% cover. There are several active gullies in the area caused by high intensity summer storms.

Large, mature Utah juniper and pinyon pine dominate the site with a canopy cover estimated at 22% in 1998. Juniper-pinyon cover at more than 20% would normally decrease understory production by at least 50%. Point quarter data from 1994 estimated pinyon density at 52 trees/acre and juniper density at 209 trees/acre. Forty-three percent of the pinyon were young with average diameters of less than one inch. Most of the junipers consisted of large mature trees, but young trees made up about 30% of the population. Overall, average basal diameter of pinyon was 3.6 inches, while that of juniper is approximately 10.2 inches. Point quarter data from 1998 estimate 70 trees/acre for pinyon and 93 for juniper. Average basal diameter is estimated at 7.7 inches for pinyon and 10.6 inches for juniper. Only 15% of the pinyon and 10% of the juniper trees sampled had basal diameters less than 3 inches.

Cliffrose is the only key browse species in the area, but it is relatively uncommon and was not sampled during any reading. There are some small plants which occur throughout the area that are heavily hedged. The taller cliffrose (up to 12 feet tall) are all highlined. The only browse sampled on the transects was broom snakeweed and cactus. The most numerous species was broom snakeweed with a density of 8,199 plants/acre reported in 1987. A majority of the population was mature, but numbers of this short lived species are known to fluctuate widely with drought as evidenced by the 92% drop in density by 1991 (665 plants/acre). During the 1994 reading with the larger sample size, there were an estimated 4,240 plants/acre. Density increased to 4,420 plants/acre by 1998. Current age class distribution indicate an expanding population with 45% of the population consisting of young plants. Seedlings were also abundant in 1998 with a biotic potential of 22%.

For an old pinyon-juniper site, diversity is good in the understory, but overall abundance of the various herbaceous plants is very low. Grasses and forbs combined to produce only just over 4% cover in 1994 and in 1998. Only 3 perennial grasses have been found on the site during each reading since 1987. These typical native species include blue grama, Indian ricegrass, and bottlebrush squirreltail. Nineteen species of forbs have been identified over the years, but most are very small plants. Searls prairie-clover, greenstem paperflower, penstemon, and Cooper hymenoxys provide some forage. All forbs combined produced less than ½ of 1% cover in 1994 and .61% cover in 1998.

1991 TREND ASSESSMENT

Basic cover characteristics have changed since last sampling date. Percent basal cover has gone from only 3% down to 1%. Rock-pavement cover has increased (34% to 41%), while percent litter has gone down (46%

to 40%). Percent bare ground has not changed much (17% to 18%). These changes have resulted in a downward trend. For browse, there are no useful forage species. Broom snakeweed is the only numerous shrub that occurred within the density plots. It's density has fallen by 92%. Browse trend would still have to be down because of the lack of useable browse species. The herbaceous understory is not fairing well, since both grasses and forbs have declining sum of nested frequency values. Trend for herbaceous understory is down.

TREND ASSESSMENT
soil - down
browse - down, very poor composition
herbaceous understory - down

1994 TREND ASSESSMENT

With continuing drought, ground cover characteristics are still declining on this site and will likely continue as long as juniper and pinyon dominate the area. Percent bare ground has increased from 18% in 1991 to 23%. Litter has also declined. Trend for soil is down. There is still no useful browse species sampled on the site so browse trend is down due to a rebound in the population of broom snakeweed. The herbaceous understory is also in a state of decline. Sum nested frequency of grasses rose slightly due to a significant increase in the low growing increaser, blue grama. Nested frequency of forbs declined 67% and combined nested frequencies of grasses and forbs declined slightly. Trend for herbaceous understory is slightly down.

TREND ASSESSMENT
soil - down
browse - no useful browse present
herbaceous understory - slightly down with very low abundance for all species except for blue grama

1998 TREND ASSESSMENT

Tend for soil is stable with similar ground cover characteristics compared to 1994 estimates. Vegetative cover increased from 12% to 18% but nested frequency of grasses and forbs declined slightly. Trend for browse would have to be considered down slightly. There are no useful species present and density of broom snakeweed has increased slightly since 1994 along with improved reproduction. Trend for the herbaceous understory is down slightly and in poor condition. All herbaceous plants combined produced only 4.5% cover.

TREND ASSESSMENT
soil - stable
browse - down slightly with no useful species present
herbaceous understory - down slightly

HERBACEOUS TRENDS --
Herd unit 25C, Study no: 22

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'87	'91	'94	'98	'87	'91	'94	'98	'94	'98
G	Aristida longiseta	-	-	3	-	-	-	1	-	.00	-
G	Bouteloua gracilis	82	74	94	81	35	31	37	28	2.65	2.71
G	Bromus tectorum (a)	-	-	-	4	-	-	-	1	-	.03
G	Carex spp.	6	2	-	-	3	2	-	-	-	-
G	Hilaria jamesii	-	3	8	-	-	1	3	-	.18	-
G	Oryzopsis hymenoides	58	49	58	29	27	25	26	15	.78	.64
G	Poa fendleriana	4	-	-	-	2	-	-	-	-	.06
G	Sitanion hystrix	$_{ab}$29	$_{a}$16	$_{a}$16	$_{b}$44	17	8	9	20	.14	.47
G	Sporobolus cryptandrus	-	-	-	4	-	-	-	1	.00	.00
G	Stipa comata	2	-	7	-	1	-	3	-	.04	-
Total Annual Grasses		0	0	0	4	0	0	0	1	0	0.03
Total Perennial Grasses		181	144	186	158	85	67	79	64	3.83	3.89
F	Artemisia dracunculus	-	4	-	-	-	2	-	-	-	-
F	Arabis holboellii	2	-	2	-	1	-	1	-	.00	-
F	Astragalus spp.	-	2	6	-	-	1	3	-	.01	-
F	Chaenactis douglasii	1	-	4	-	1	-	2	-	.01	-
F	Chenopodium spp. (a)	-	-	-	2	-	-	-	1	-	.00
F	Cryptantha fulvocanescens	27	17	8	10	12	8	4	4	.09	.04
F	Dalea searlsiae	11	4	3	11	6	3	2	6	.01	.25
F	Descurainia pinnata (a)	-	-	6	5	-	-	3	2	.01	.03
F	Gilia hutchinifolia (a)	-	-	4	-	-	-	3	-	.01	-
F	Hymenoxys acaulis	$_{b}$9	$_{b}$9	$_{ab}$4	$_{a}$-	6	6	2	-	.06	-
F	Hymenoxys cooperi	$_{b}$17	$_{a}$5	$_{a}$-	$_{a}$1	10	3	-	1	-	.00
F	Ipomopsis aggregata	-	2	-	-	-	1	-	-	-	-
F	Lesquerella ludoviciana	$_{c}$63	$_{bc}$59	$_{ab}$30	$_{a}$24	29	25	15	12	.11	.25
F	Lithospermum incisum	-	-	3	-	-	-	1	-	.03	-
F	Orthocarpus purpureo-albus (a)	7	-	-	-	5	-	-	-	-	-
F	Penstemon strictus	1	1	3	4	1	1	1	2	.00	.01
F	Psilostrophe sparsiflora	$_{b}$11	$_{ab}$9	$_{b}$10	$_{a}$-	6	3	5	-	.19	-
F	Salsola iberica (a)	$_{a}$-	$_{b}$6	$_{a}$-	$_{a}$-	-	5	-	-	-	-
F	Streptanthus cordatus	-	4	-	3	-	1	-	1	-	.00
F	Townsendia incana	6	6	-	-	2	3	-	-	-	-
Total Annual Forbs		7	6	10	7	5	5	6	3	0.02	0.03
Total Perennial Forbs		148	122	73	53	74	57	36	26	0.54	0.58

Values with different subscript letters are significantly different at % = 0.10

BROWSE TRENDS --
Herd unit 25C, Study no: 22

Type	Species	Strip Frequency '94	Strip Frequency '98	Average Cover % '94	Average Cover % '98
B	Echinocereus spp.	-	-	-	.15
B	Gutierrezia sarothrae	61	61	.43	1.55
B	Juniperus osteosperma	0	8	4.78	8.32
B	Opuntia spp.	3	2	-	.03
B	Pinus edulis	0	2	.71	2.04
Total for Browse		64	73	5.92	12.10

CANOPY COVER --
Herd unit 25C, Study no: 22

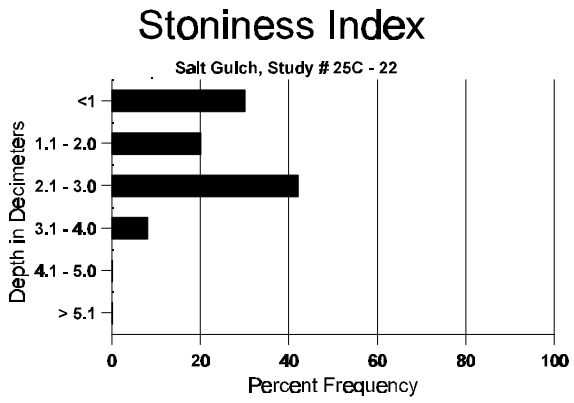
Species	Percent Cover '98
Juniperus osteosperma	18
Pinus edulis	4

BASIC COVER --
Herd unit 25C, Study no: 22

Cover Type	Nested Frequency '94	Nested Frequency '98	Average Cover % '87	'91	'94	'98
Vegetation	215	213	3.25	1.25	11.62	18.08
Rock	324	312	27.00	28.75	27.08	29.30
Pavement	273	238	6.50	11.75	7.07	9.39
Litter	376	381	46.25	40.00	30.94	31.72
Cryptogams	9	9	0	.25	.06	.09
Bare Ground	307	308	17.00	18.00	22.53	21.07

SOIL ANALYSIS DATA --
Herd Unit 25C, Study # 22, Study Name: Salt Gulch

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
12.6	61.8 (14.5)	7.2	58.0	23.4	18.6	2.6	9.0	67.2	.6



PELLET GROUP FREQUENCY --
Herd unit 25C, Study no: 22

Type	Quadrat Frequency '94	'98
Rabbit	38	20
Elk	-	4
Deer	34	24

BROWSE CHARACTERISTICS --
Herd unit 25C, Study no: 22

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Gutierrezia sarothrae																		
S	87	4	-	-	-	-	-	-	-	-	4	-	-	-	266			4
	91	-	-	-	1	-	-	-	-	-	1	-	-	-	66			1
	94	4	-	-	-	-	-	-	-	-	4	-	-	-	80			4
	98	62	-	-	-	-	-	-	-	-	62	-	-	-	1240			62
Y	87	26	-	-	-	-	-	-	-	-	26	-	-	-	1733			26
	91	4	-	-	-	-	-	-	-	-	4	-	-	-	266			4
	94	72	-	-	-	-	-	-	-	-	72	-	-	-	1440			72
	98	99	-	-	-	-	-	-	-	-	99	-	-	-	1980			99
M	87	97	-	-	-	-	-	-	-	-	97	-	-	-	6466	8	8	97
	91	5	-	-	-	-	-	-	-	-	5	-	-	-	333	4	4	5
	94	137	-	-	-	-	-	-	-	-	137	-	-	-	2740	6	5	137
	98	121	-	-	-	-	-	-	-	-	118	3	-	-	2420	11	11	121
D	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	1	-	-	-	-	-	-	-	-	-	-	-	1	66			1
	94	3	-	-	-	-	-	-	-	-	2	-	-	1	60			3
	98	1	-	-	-	-	-	-	-	-	-	-	-	1	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	00%	00%	-92%
'91	00%	00%	10%	+84%
'94	00%	00%	.47%	+ 4%
'98	00%	00%	.45%	

Total Plants/Acre (excluding Dead & Seedlings)			Dec:
'87	8199		0%
'91	665		10%
'94	4240		1%
'98	4420		0%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Juniperus osteosperma																		
S	87	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	-	-	-	1	-	-	-	-	-	1	-	-	-	20			1
Y	87	1	-	-	-	-	-	-	-	-	-	-	1	-	66			1
	91	1	-	-	-	-	-	-	-	-	-	-	1	-	66			1
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	3	-	-	-	-	-	-	-	-	3	-	-	-	60			3
M	87	1	-	-	-	-	-	2	-	-	3	-	-	-	200	171	118	3
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	98	2	-	-	2	-	-	-	1	-	5	-	-	-	100	-	-	5
D	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	-	-	-	1	-	-	1	-	-	2	-	-	-	133			2
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	-	-	-	-	-	-	-	1	-	1	-	-	-	20			1
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	60			3

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	00%	25%	-25%
'91	00%	00%	33%	
'94	00%	00%	00%	
'98	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'87	266	Dec:		0%
'91	199			67%
'94	0			0%
'98	180			11%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Opuntia spp.																		
S	87	2	-	-	-	-	-	-	-	-	2	-	-	-	133			2
	91	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
Y	87	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	91	2	-	-	1	-	-	2	-	-	5	-	-	-	333			5
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
M	87	2	-	-	-	-	-	-	-	-	2	-	-	-	133	7	13	2
	91	3	-	-	-	-	-	-	-	-	3	-	-	-	200	8	11	3
	94	3	-	-	-	-	-	-	-	-	3	-	-	-	60	4	14	3
	98	2	-	-	-	-	-	-	-	-	2	-	-	-	40	4	14	2
D	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	2	-	-	-	-	-	-	-	-	1	-	-	1	133			2
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	00%	00%	+70%
'91	00%	00%	10%	-91%
'94	00%	00%	00%	+25%
'98	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'87	199	Dec:	0%
	'91	666		20%
	'94	60		0%
	'98	80		0%

Pinus edulis																		
S	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	3	-	-	-	-	-	-	-	-	3	-	-	-	60			3
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	-	-	-	1	-	-	-	-	-	1	-	-	-	66			1
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	87	1	-	-	-	-	-	-	-	-	1	-	-	-	66	138	63	1
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	98	1	-	-	-	-	-	1	-	-	2	-	-	-	40	-	-	2

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	00%	00%	+ 0%
'91	00%	00%	00%	
'94	00%	00%	00%	
'98	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'87	66	Dec:	-
	'91	66		-
	'94	0		-
	'98	40		-